Center Independent Research & Development: JPL IRAD

Amorphous Metal Composites for use in Long-Life, Low-Temperature Gearboxes

Completed Technology Project (2012 - 2013)

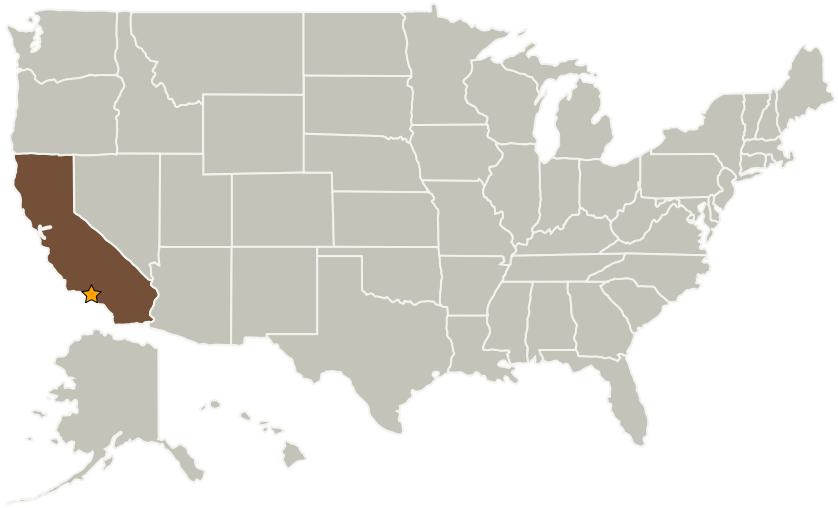
Project Introduction

The proposed concept is to explore the use of Amorphous Metals (AMs) and Amorphous Metal Composites (AMCs) (fabricated entirely at JPL) for use as gears and bearing at both ambient and cryogenic temperatures. The goal is to exploit the advantageous mechanical properties of the AM's and AMC's (strength, hardness, low-density, toughness) and demonstrate that they outperform conventionally used gearbox materials. Previous studies have shown that ceramic gears can provide far better wear performance than metal gears, however they are traditionally avoided because they are prone to brittle failure due to their low fracture toughness.

Anticipated Benefits

Missions will benefit from research on Amorphous Metal (AMs) and Amorphous Metal Composites (AMCs) for use as gears and bearing at both ambient and cryogenic temperatures.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Amorphous Metal Composites for use in Long-Life, Low-Temperature Gearboxes

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Amorphous Metal Composites for use in Long-Life, Low-Temperature Gearboxes

Completed Technology Project (2012 - 2013)

Primary U.S. Work Locations

California

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

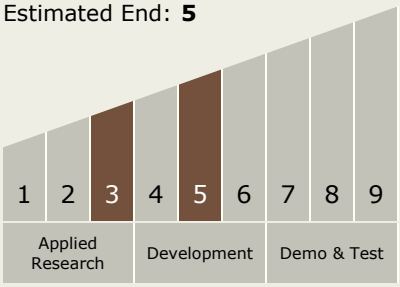
Jonas Zmuidzinas

Principal Investigator:

Andrew J Kennett

Technology Maturity (TRL)

Start: **3**
Estimated End: **5**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.4 Materials for Extreme Environments